

What is claimed is:

1. A tunnel magnetoresistive effective element comprising a ferromagnetic tunnel effective film, a magnetic bias means, a first conductive layer, and a second conductive layer

the ferromagnetic tunnel effective film has a free layer, a pinned layer and a tunnel barrier layer sandwiched between the free layer and the pinned layer, the magnetic bias means applying a bias magnetic field to the free layer, the first conductive layer being formed on one surface of the ferromagnetic tunnel effective film so as to be electrically conducted to the ferromagnetic tunnel effective film,

the second conductive layer being formed on the other surface of the ferromagnetic tunnel effective film so as to be electrically conducted to the ferromagnetic tunnel effective film,

at least one of the first conductive layer and the second conductive layer generating a magnetic field having the same direction as that of the bias magnetic field through a sense current therein.

2. A tunnel magnetoresistive effective element as defined in claim 1, wherein the first conductive layer includes a first electrode/magnetic shielding portion and a first leading electrode portion, and the first electrode/magnetic shielding portion is provided on the one surface of the ferromagnetic tunnel effective film, and the first leading electrode portion is electrically conducted to a part of the first/magnetic shielding portion at a position in which a magnetic field having the same direction as the bias magnetic field is generated by a sense current in the first electrode/magnetic shielding portion.

3. A tunnel magnetoresistive effective element as defined in claim 2, wherein the first leading electrode portion is electrically conducted to the part of the first electrode/magnetic shielding portion at a position, along the bias magnetic field direction, apart from a center line of the ferromagnetic tunnel

effective film orthogonal to the bias magnetic field.

INS a1

4. A tunnel magnetoresistive effective element as defined in claim 2 or 3, wherein the second conductive layer includes a second electrode/magnetic shielding portion and a second leading electrode portion, and the second electrode/magnetic shielding portion is provided on the other surface of the ferromagnetic tunnel effective film, and the second leading electrode portion is electrically conducted to a part of the second electrode/magnetic shielding portion at a position in which a magnetic field having the same direction as that of the bias magnetic field is generated by a sense current in the second electrode/magnetic shielding portion.

5. A tunnel magnetoresistive effective element as defined in claim 4, wherein the second leading electrode portion is electrically conducted to the part of the second electrode/magnetic shielding portion at a position, along the bias magnetic field direction, apart from the center line of the ferromagnetic tunnel effective film orthogonal to the bias magnetic field.

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6. A tunnel magnetoresistive effective element as defined in claim 4 or 5, wherein the first leading electrode portion and the second leading electrode portion are provided in respective different sides from the center line of the ferromagnetic tunnel effective film.

7. A tunnel magnetoresistive effective element as defined in claim 4 or 5, wherein the first leading electrode portion and the second leading electrode portion are provided in either side from the center line of the ferromagnetic tunnel effective film.

8. A tunnel magnetoresistive effective element as defined in claim 6 or 7, wherein a planer angle of a line segment to a first center point of a boundary line between the first electrode/magnetic shielding portion and the first leading electrode portion from a center point of the ferromagnetic tunnel effective film for the bias magnetic field direction or a planer angle of a line segment to a second

INS a2 center point of a boundary line between the second electrode/magnetic shielding portion and the second leading electrode portion from the center point of the ferromagnetic tunnel effective film for the bias magnetic field direction is set to 5 degrees or over.

INS a3 9. A tunnel magnetoresistive effective element as defined in any one of claims 1-8, wherein the magnetic bias means includes a bias magnetic field-inductive layer to apply a given bias magnetic field to the free layer of the ferromagnetic tunnel effective film and a magnetic bias applying means to apply a given magnetic field to the bias magnetic field-inductive layer.

10. A tunnel magnetoresistive effective element as defined in claim 9, wherein the bias magnetic field-inductive layer includes a flux guide portion of which one end constitutes a flux probe portion having its width smaller than that of the bias magnetic field-inductive layer and projecting from ends of the bias magnetic field-inductive layer.

11. A tunnel magnetoresistive effective element as defined in claim 10, wherein the magnetic bias means includes a bias magnetic field-inductive layer to apply a given bias magnetic field to the free layer of the ferromagnetic tunnel effective film, a magnetic bias applying means to apply a given magnetic field to the bias magnetic field-inductive layer, and a flux guide layer stacked with the bias magnetic field-inductive layer so that its longitudinal direction is crossed to the bias magnetic field from the bias magnetic field-inductive layer and magnetically joined with the free layer of the ferromagnetic tunnel effective film, one end of the flux guide layer constituting a flux probe portion having its width smaller than that of the bias magnetic field-inductive layer and projecting from ends of the bias magnetic field-inductive layer.

INS a4 12. A thin film magnetic head comprising at least one reading element composed of a tunnel magnetoresistive effective element as defined in any one of claims 1-11.

13. A thin film magnetic head as defined in claim 12, further comprising at least one writing element.

14. A thin film magnetic head as defined in claim 13, wherein the writing element is composed of an inductive type electromagnetic converting element including a first magnetic film, a second magnetic film and a gap film, and the forefronts of the first magnetic film and the second magnetic film is separated by the gap film, thereby to constitute a writing pole portion.

15. A thin film magnetic head as defined in claim 13, wherein the writing element is composed of an inductive type electromagnetic converting element including a first magnetic film and a second magnetic film having a main magnetic pole portion to constitute a perpendicular writing pole portion and a supplementary magnetic pole portion to magnetically combine the main magnetic pole portion and the first magnetic film.

16. A magnetic head device comprising a thin film magnetic head as defined in any one of claims 12-15 and a head supporting device to support the thin film magnetic head.

17. A magnetic recording drive device comprising a magnetic head device as defined in claim 16 and a magnetic disk to be magnetically recorded and reproduced by the magnetic head device.

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